Spin meeting minutes, 10/25/2006

Nick first reported the lattice functions with MAD8 running in couple mode. The difference in tune between with couple mode and without couple mode is in the 10^{-3} level and beta function changes are also small. Thomas questioned why ΔQ_{min} is lower by ten times after raising vertical tune from 8.76 to 8.98. Nick presented the way he calculates the ΔQ_{min}. He also presented the preliminary results of minimizing coupling by I10 solenoid and skew quad.

The meeting then switch gear to polarized deuteron beam for EDM (Electric Dipole Moment) experiment. Anatoli presented the challenge linac faces. EDM experiment will have its own ring which is 25m in circumference. It needs longitudinally polarized deuteron of 520MeV (maximum) and 10^{12} intensity (Yannis said that this requirement can be relaxed by a factor two or more). Current OPPIS source can provide 4.8×10^{12} D^-/pulse with 56% vector polarization and zero tensor polarization. An source upgrade can provide 80% vector polarization but half the intensity. To use existing linac, one has to use D^-, otherwise, the same source can provide 10 times more intensity for D^+. The linac is desiged for H^-, so only first three acceleration tanks can be used for D^-, which gives only 30MeV. Adding power to tank 4 probably can go to slightly higher energy, but it is a significant amount of work and is not a plausible solution. Adding another superconducting linac is not cost effective. The effeciency of the linac is merely 5% for D^- (50% for H^-), so the intensity at the end of linac is only 1/8 of the desired intensity. There are two options here. Anatoli can increase intensity by a factor 10 if a new RFQ is installed. Or we can accumulate 8 bunches in the AGS. The later is very difficult. Anatoli also showed that a thinner foil could reduce beam loss and emittance blow up at Booster injection. One other option is to use EBIS line insdead of exisintg linac. The injection energy will be much lower and a new source is likely needed. Yannis asked us what intensity we can provide. Thomas stated that space charge is a major concern at Booster injection. So the first limit would be Booster acceptance limit (after the meeting, Leif also warned that the extraction may be a more severe constraint). One has to compress the bunches to less than 100ns (EDM ring revolution period is 140ns, kicker has rising and falling edges) for the required single turn injection. It is not trivial even we use Booster only wthout AGS (circumference ratio is 8:1 between Booster and EDM ring). Naturally, when compresed in longgitudinal direction, transverse emittance growth is going to happen. The question is then how much D^- can be put into Booster injection aperture (and extraction aperture). Alfredo will try to give that estimation. For longitudinally polarized beam, Thomas suggested to use solenoid, since it is less sensitive to the small G value. Thomas estimated roughly a 10Tm solenoid is needed. As a comparison, AGS I10 solenoid is 4.7Tm. Another idea is rf solenoid. Haixin will give estimate on the strength needed. Yannis said that CERN can provide 5×10^{10} D^- beam. Thomas asked about funding situation since it is important for CAD personnel involvement. Yannis responded that the funding future is positive but pending on the new budget.

Haixin